



ISSUES REPORT



Client: Banana Shire Council/ Biloela Teys Bros Meatworks		CWT Project Reference: BOM379		
Impact of Supply of Town Water to Biloela Meatworks on WTP Upgrade Requirements				
Date	Revision	Issued To	Prepared By	Approved By
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1. Introduction

This report outlines City Water Technology's investigation into the impacts of supplying treated town water to the Biloela Meatworks in terms of the upgrades required to the Biloela water treatment plant (WTP) to meet this additional demand. Upgrade requirements and budget costs have been determined for ultimate demand scenarios with and without the additional Meatworks demand to enable the impacts to be determined.

This study was undertaken as an extension of work addressing planning issues for the Biloela WTP. Further details on various issues associated with the WTP are available in the Biloela WTP Planning Report (City Water Technology, Rev B June 2009).

2. Meatworks Water Supply Requirements

The Meatworks currently use a private bore for water supply, however there are concerns that the bore water may become unavailable in future due to ongoing drought. The supply of town water to the Meatworks has therefore been investigated as an alternative water source option.

The Meatworks potential water demand levels are understood to be 1 to 2 ML/d. On long term or permanent failure of the Meatworks bore source, it is assumed that the full demands would need to be met using town water.

It is understood that a new mains pipe to the Meatworks would be connected from the WTP treated water trunk main and that the Meatworks facilities would include an onsite water storage tank for the town water. These items have not been investigated or costed as part of this study and it is assumed that they would be provided separately by the Meatworks.

3. Total Water Demands and Current WTP Capacity

3.1 Total Water Demands With and Without Meatworks

Current water demands on the Biloela WTP include the combined town demands (Biloela, Thangool and Callide Township) plus a 2.5 ML/d allocation to Callide power station. For the combined town demands, an average daily demand of 6.4 ML/d has been estimated for the ultimate development of Biloela and surrounds. Thus the potential Meatworks demand of 1 to 2 ML/d would increase the total ultimate average daily demand for town water from 8.9 ML/d up to 9.9 - 10.9 ML/d.

The town water has in the past been sourced from both the Biloela WTP and the town bores, with the water blended at the main town reservoirs. However under the current dry conditions the town bores are unable to supply sustainable flow. It is assumed that the town bores would also be unavailable under any conditions which caused the failure of the Meatworks bore, thus when the Meatworks require the supply of town water, the total town water supply will be sourced from the WTP.

The average, maximum and mean day maximum month (MDMM) town water demands under ultimate development conditions were determined by standard calculations, with the MDMM value adopted as the value used for sizing the WTP capacity as per Banana Shire Council's standard approach. These figures are shown in the table below for the scenarios with and without the Meatworks demands. It is noted that potential reduced WTP demand levels associated with supplemental flow from the town bores and/ or permanent water restrictions implemented by Council may be possible but are not addressed in this report.

The required WTP inlet flow rate to achieve the daily production volume, also shown in the table below, was determined based on an allowance for 10% water losses through the WTP process and maximum 20 hours WTP operation per day.

Full Development Demands for WTP Treated Water

Demand Condition	Town and Power Station Demands			Total WTP Demand	
	Towns	Power Station	Town + Power Station	Without Meatworks	With Meatworks 1 – 2 ML/d
Average Day (ML/d)	6.4	2.5	8.9	8.9	9.9 - 10.9
Calculated Max Day (ML/d)	14.4	2.5	16.9	16.9	17.9 – 18.9
Mean Day Max Month used for WTP Sizing (ML/d)	9.6	2.5	12.1	12.1	13.1 – 14.1
Required WTP Inlet Flow Rate (L/s)	-	-	-	190	210 - 220

3.2 Current WTP Capacity

As part of planning investigations for the Biloela WTP, the WTP capacity was investigated in detail by looking at the capacity of all sub-processes and undertaking a plant flow rate trial. The WTP inlet flow capacity varies depending on the raw water quality conditions, and was determined to be:

- 120 – 130 L/s under typical raw water quality conditions;
- 80 L/s under poor raw water quality conditions.

Comparing the existing WTP capacity with the ultimate total demands, it can be seen that the WTP would need to be upgraded to meet the demands even if the Meatworks did not require town water supply, however the size of the upgraded WTP would be greater if the Meatworks demand was incorporated for the upgrade.

It is noted that during the detailed WTP investigation various opportunities for improvement of the WTP process were identified. Only issues which directly impact on the capacity upgrade requirements have been detailed in this report. More detail on other issues is available in the Biloela WTP Planning Report.

4. WTP Capacity Upgrade Requirements and Costs

4.1 Upgrade Requirements

The upgrades required to meet the estimated ultimate demand targets were investigated in detail for each step of the WTP process and supporting equipment. Overall, the increase in WTP capacity would require the augmentation of the full WTP process by the addition of a Stage 2 process. Stage 2 treatment process options considered include conventional treatment with settling (similar to Stage 1 process), and an alternative using dissolved air flotation (DAF) clarification. Further evaluation to identify the preferred Stage 2 process option is expected to be undertaken during the concept design phase.

System upgrades considered necessary to achieve the target WTP production volumes with and without the proposed additional Meatworks demand are summarised in the following table. The design total WTP intake flow rates shown were selected as appropriate to meet the target flow rates under most raw water quality conditions, and to allow modular design.

It is noted that the provision of a second clear water tank is shown in the table, although this is required for reasons additional to the capacity upgrades and therefore not included in costs given below. Upgrade of the treated water trunk main is also included in the table and in the total costs, although this upgrade may be avoided if an alternative hydraulic solution is found to increase the water transfer rate into town. It is also noted that upgrades to the reservoir inlet tank would be similar for both options, assuming that water for the Meatworks will be drawn off the trunk main prior to the town reservoirs.

WTP Upgrade Requirements for Forecast Demand Scenarios

Parameter	Existing WTP Facilities	Upgraded WTP Requirements	
		Without Meatworks Demand	With Meatworks Demand
Design Total WTP Intake Capacity (L/s):			
(A) Typical raw water quality	(A) 120	210	240
(B) Poor raw water quality	(B) 80	170	200
Required Upgrades:			
Raw Water Pump Station	2 pumps	Add third pump	Add third pump
Raw Water Main	Single main	Allow for upgrade to suit design flow	Allow for upgrade to suit design flow
WTP Inlet Fittings and Flash Mixing Tank	Various	Upgrade fittings and/or tank	Upgrade fittings and/or tank
Clarifiers	2 clarifiers	Add 1 x settling clarifier (or DAF equivalent)	Add 2 x settling clarifiers (or DAF equivalent)
Filters	4 filters	Add 3 x filters	Add 4 x filters
Filtered Water Well	Common well for all filters	Connect new filters to existing well	Allow for upgrade/duplication
Clear Water Tank	1 tank	2 nd tank to be added	2 nd tank to be added
Wastewater Surge Tank and Sludge Lagoon	Surge tank and lagoons	Allow for surge tank upgrade	Allow for surge tank upgrade

Parameter	Existing WTP Facilities	Upgraded WTP Requirements	
		Without Meatworks Demand	With Meatworks Demand
Lagoon Supernatant Recycle	2 pumps	Add third pump	Add third pump
Chemical Dosing System Upgrades	Various	Upgrade most chemical systems to suit design flow	Upgrade most chemical systems to suit design flow
Treated Water Trunk Main	Gravity fed	Install booster pump to suit design flow	Install booster pump to suit design flow
Town Reservoir Inlet Mixing Tank Upgrades	Limited hydr. capacity	Upgrade tank hydraulic capacity	Upgrade tank hydraulic capacity

4.2 Estimated Costs for Upgrade Works

Indicative budget costs were estimated for each upgrade task shown in the previous section, based on industry knowledge of costs for similar equipment with allowances added for commissioning, O&M manuals, engineering, design, project management and contingency. The total estimated costs for capacity upgrades with and without the additional Meatworks demands are shown in the table below. Costs are shown for both of the Stage 2 process options, although it is noted that the Stage 2 process selection depends on various factors to be further investigated at the concept design stage. Further details of the basis of the budget costs are available in the Biloela WTP Planning Report (CWT, June 2009).

Capacity Upgrade Requirements Cost Estimates Summary

Upgrade Works		Estimated Cost	
		Without Meatworks Demand	With Meatworks Demand
All identified upgrades except treated water trunk main and reservoir upgrades	A. Stage 2 process similar to Stage 1 (settling clarifiers plus filters)	\$ 3,700,000	\$ 5,000,000
	B. Alternative Stage 2 process of DAF above Filters	\$ 3,550,000	\$ 4,300,000
Treated water trunk main addition of booster pump station and town reservoir inlet modification		\$ 340,000	\$ 365,000

5. Conclusions

As seen above, an additional demand of 1 to 2 ML/d for the supply of town water to the Meatworks will increase the size of the WTP upgrades required to meet projected ultimate demands, although WTP capacity upgrades would still be required to meet ultimate demands even without supply to the Meatworks.

It is estimated that the additional Meatworks demand would increase the total cost of WTP capacity upgrades by around \$775,000 to \$1.3 million, depending on the process option selected for Stage 2 of the upgraded WTP.